

Technical Management Team
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Effects of Transport History on Performance on Adult Salmonid Migrants.

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Background

From 2000 to 2003, we radio-tagged

457 Snake River spring/summer Chinook Salmon and

727 Snake Rive steelhead.

60% of Chinook salmon had been barged

62% of steelhead had been barged

Known-source fish were monitored to determine homing, straying, survival and fallback for barged in in-river migrants.

Homing

Chinook salmon – About 10% lower homing rate for transported fish.

		Percent (n) that homed			
Group by:	Year	River	Barge	χ^2	<i>P</i>
<u>Chinook salmon</u>					
All fish	All	92.6 (161)	82.5 (245)	8.5	0.004
Adult return	2000	75.0 (8)	64.3 (14)	0.3	0.604
	2001	93.8 (81)	83.4 (151)	5.0	0.025
	2002	95.2 (42)	82.5 (40)	3.4	0.065
	2003	90.0 (30)	85.0 (40)	0.4	0.536
Outmigration	1998	85.7 (14)	63.2 (19)	2.1	0.151
	1999	94.1 (85)	82.2 (163)	6.7	0.010
	2000	91.9 (62)	92.5 (40)	0.0	0.918
	2001		82.6 (23)		
Fin clipped	All	90.6 (53)	80.3 (117)	2.8	0.096
No clips	All	93.5 (108)	84.4 (128)	4.8	0.028

Homing

Steelhead – Generally less effect than for Chinook salmon, except 2003.

		Percent (n) that homed			
Group by:	Year	River	Barge	χ^2	<i>P</i>
<u>Steelhead</u>					
All fish	All	88.7 (238)	75.6 (409)	16.4	<0.001
Adult return	2001	89.3 (112)	72.7 (154)	11.0	<0.001
	2002	87.3 (110)	79.1 (201)	3.2	0.073
	2003	93.8 (16)	70.4 (54)	3.7	0.055
Outmigration	1999	83.3 (36)	75.4 (61)	0.8	0.360
	2000	89.3 (186)	78.8 (226)	8.1	0.004
	2001		70.1 (87)		
	2002	93.8 (16)	68.6 (35)	3.9	0.049
Fin clipped	All	87.1 (70)	79.7 (59)	1.3	0.252
No clips	All	89.3 (168)	74.9 (350)	14.5	<0.001

Fallback

Barged Chinook salmon fell back more and more often than in-river migrants.

		Percent (n) that fell back				Fallback frequency		
Group by:	Year	River	Barge	χ^2	<i>P</i>	River	Barge	<i>t--test P</i>
<u>Chinook salmon</u>								
All fish	All	7.5 (161)	19.2 (245)	10.8	0.001	1.1 (12)	2.7 (47)	0.015
Adult return	2000	25.0 (8)	50.0 (14)	1.3	0.251	1.0 (2)	3.1 (7)	
	2001	2.5 (81)	15.2 (151)	8.9	0.003	1.0 (2)	3.1 (23)	
	2002	14.3 (42)	25.0 (40)	1.5	0.221	1.0 (6)	2.5 (10)	0.085
	2003	6.7 (30)	17.5 (40)	1.8	0.180	1.5 (2)	1.1 (7)	
Outmigration	1998	21.4 (14)	36.8 (19)	0.9	0.341	1.0 (3)	3.1 (7)	
	1999	1.2 (85)	17.2 (163)	13.9	<0.001	1.0 (1)	3.2 (28)	
	2000	12.9 (62)	20.0 (40)	0.9	0.336	1.1 (8)	1.4 (8)	0.278
	2001		17.4 (23)				1.0 (4)	
Fin clipped	All	3.8 (53)	18.0 (117)	6.3	0.012	1.0 (2)	3.8 (21)	
No clips	All	9.3 (108)	20.3 (128)	5.5	0.019	1.1 (10)	1.8 (26)	0.137

Fallback

Steelhead – similar pattern as Chinook salmon, effect not as strong.

		Percent (n) that fell back				Fallback frequency		
Group by:	Year	River	Barge	χ^2	<i>P</i>	River	Barge	<i>t--test P</i>
<u>Steelhead</u>								
All fish	All	10.5 (238)	18.1 (409)	6.7	0.010	1.2 (25)	2.1 (74)	0.003
Adult return	2001	8.9 (112)	18.8 (154)	5.1	0.024	1.2 (10)	2.1 (29)	0.050
	2002	12.7 (110)	13.4 (201)	0.0	0.860	1.1 (14)	1.6 (27)	0.129
	2003	6.3 (16)	33.3 (54)	4.6	0.032	1.0 (1)	2.8 (18)	
Outmigration	1999	11.1 (36)	14.8 (61)	0.3	0.661	1.0 (4)	1.7 (9)	
	2000	10.8 (186)	15.5 (226)	2.0	0.160	1.2 (20)	1.9 (35)	0.031
	2001		20.7 (87)				2.3 (18)	
	2002	6.3 (16)	34.3 (35)	4.5	0.033	1.0 (1)	2.8 (12)	
Fin clipped	All	14.3 (70)	13.6 (59)	0.0	0.906	1.1 (10)	2.3 (8)	0.047
No clips	All	8.9 (168)	18.9 (350)	8.5	0.004	1.2 (15)	2.1 (66)	0.032

Summary

During low flow years and when spill reduced, proportion of fish transported will increase.

Fish that were barged as juveniles had lower survival to natal areas, likely because of greater straying and fallback behavior.

Evidence related specifically to 2001 outmigration year not complete.

Most PIT tagged fish were transported; no in-river comparison group.
2004 data not yet complete and less coverage than in past years.